WILCO
OILFIELD SERVICES PTE LTD

Recommended Safe Working Load of a stainless steel wire (RSL)

The safe working load (RSL) of a stainless steel wire is calculated from the minimum breaking load (MBL)of a wire and can be calculated in two different ways:

In common with most stainless steel alloy wires it is either based on 60% of the MBL or 75% of the effective breaking load (EBL) where the EBL is the MBL minus the weight of wire in use plus the tool weight.

Option 1: RSL = 60% MBL

0r alternatively option 2: RSL = 75% EBL; where (EBL= MBL – weight of wire -tool weight)

The recommended safe load (RSL) has to be below the breaking load when the weight of wire used and the tool weight used are added to the pull weight. There has to be a safety factor included as well to prevent any permanent stretch of the wire. At greater depths with a longer length of wire hanging and greater weight then the calculation using 75% EBL is more conservative as can be seen in the examples below.

In practice using information from the Wilco 2507 SDSS wire datasheet as follows the RSL can be calculated:

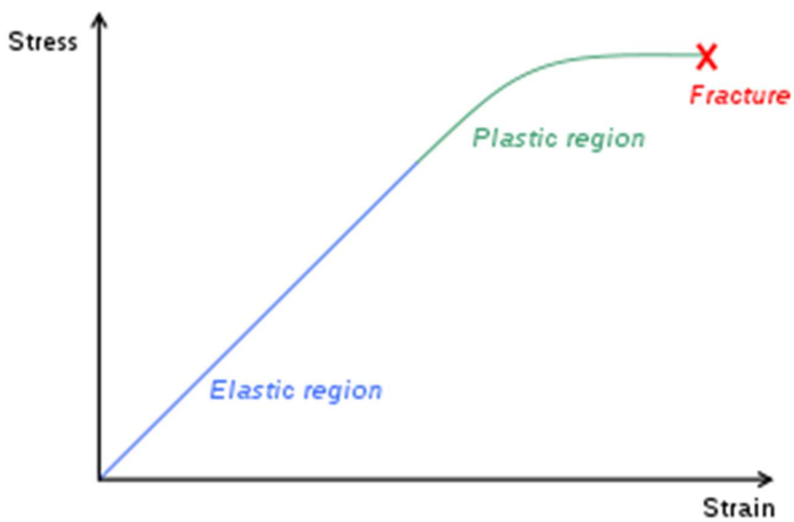
Wire Dia "	Min BL lbf	Length ft	Wire Weight lbs	Tool weight lbs	RSL from MBL lbf	RSL from EBL lbf
0.092	1920	5000	113	200	1152	1205
0.108	2550	5000	156	200	1530	1646
0.125	3325	5000	209	200	1995	2187
0.140	4100	5000	262	200	2460	2729
0.160	5150	5000	342	200	3090	3456

Wire Dia "	Min BL lbf	Length ft	Wire Weight lbs	Tool weight lbs	RSL from MBL lbf	RSL from EBL lbf
0.092	1920	10000	226	200	1152	1121
0.108	2550	10000	311	200	1530	1529
0.125	3325	10000	417	200	1995	2031
0.140	4100	10000	523	200	2460	2533
0.160	5150	10000	683	200	3090	3200

Wire Dia "	Min BL lbf	Length ft	Wire Weight lbs	Tool weight lbs	RSL from MBL lbf	RSL from EBL lbf
0.092	1920	15000	339	200	1152	1036
0.108	2550	15000	467	200	1530	1413
0.125	3325	15000	626	200	1995	1875
0.140	4100	15000	785	200	2460	2337
0.160	5150	15000	1025	200	3090	2944

Wire Dia "	Min BL lbf	Length ft	Wire Weight lbs	Tool weight lbs	RSL from MBL lbf	RSL from EBL lbf
0.092	1920	20000	452	200	1152	951
0.108	2550	20000	622	200	1530	1296
0.125	3325	20000	834	200	1995	1718
0.140	4100	20000	1046	200	2460	2141
0.160	5150	20000	1366	200	3090	2688

A stress strain curve from a tensile test on a stainless steel wire is shown below and the first portion of the curve is linear, i.e. elastic deformation, it will stretch and return back to its original length as the load is increased and decreased. At a certain point the line will deviate from linear and the deformation becomes plastic, i.e. permanent. This position varies dependent on the material grade, the amount of cold work and the strain rate. Therefore to prevent permanent deformation of a wire under tension the load has to be regulated and has to be kept below the plastic region and requires a factor of safety to allow for individual conditions. The limit of proportionality, that is when it changes from elastic to plastic deformation can be from around 70% to 90% of the breaking load.



The operator has a choice therefore, whether to go with the conservative calculation or not and this will depend on the surety of all the parameters used in the calculation when carrying out work.